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What is claimed is:

1. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween, the third raceway prevented from being more spaced on the second member from the fourth raceway, the fourth raceway fitted onto the second member in a relatively movable interference relationship, such that the fourth raceway is movable toward the third raceway with an axial force relatively applied to the fourth raceway and the second member, and

the method comprising the steps of relatively applying the axial force to the fourth raceway and the second member so as to move the fourth raceway closer to the third raceway while detecting a parameter of press-in condition

and stopping the axial force when the parameter reaches a predetermined value, thereby applying a preload to the bearing apparatus.

2. The method of Claim 1, wherein the parameter of press-in condition is a rotation vibration of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the rotation vibration of the bearing apparatus, and stopped when the rotation vibration of the bearing apparatus reaches a predetermined value.

3. The method of Claim 2, wherein the rotation vibration is produced in one of a moment direction, in a direction perpendicular to the axis, and in an axial direction.

4. The method of Claim 1, wherein the parameter of press-in condition is a rotation sound of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the rotation sound of the bearing apparatus, and stopped when the rotation sound of the bearing apparatus reaches a predetermined value.

5. The method of Claim 1, wherein the parameter of press-in condition is a response to a vibration applied to the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the response, and stopped when the response reaches a predetermined value.

6. The method of Claim 1, wherein the parameter of press-in condition is a rotation torque of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the torque, and stopped when the torque reaches a predetermined value.

7. The method of Claim, wherein the parameter of press-in condition is an electric power consumption in rotation of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the electric power consumption, and stopped when the electric power consumption reaches a predetermined value.

8. The method of Claim 1, wherein the parameter of press-in condition is a pressure on the fourth raceway moved closer to the third raceway, and the fourth raceway is moved closer to the third raceway while detecting the pressure, and stopped when the pressure increases a predetermined value.

9. The method of Claim 8, wherein a temperature difference is produced between the fourth raceway and the second member to reduce the amount of interference, and is removed after the fourth raceway moved closer to the third raceway is stopped.

10. The method of Claim 8, wherein a temperature difference is produced between the fourth raceway and the second member to eliminate the interference, and removed

after the fourth raceway moved closer to the third raceway is stopped.

11. The method of Claim 1, wherein the parameter of press-in condition is a capacitance between the radially opposed raceways with the balls therebetween, and the fourth raceway is moved closer to the third raceway while detecting the capacitance, and stopped when the capacitance reaches a predetermined value.

12. The method of Claim 1, wherein the parameter of press-in condition is an electric resistance between the radially opposed raceways with the balls therebetween, and the fourth raceway is moved closer to the third raceway while detecting the electric resistance, and stopped when the electric resistance reaches a predetermined value.

13. The method of Claim 1, wherein the parameter of press-in condition is a deformation of at least one of the raceways, and the fourth raceway is moved closer to the third raceway while detecting the deformation, and stopped when the deformation reaches a predetermined amount.

14. The method of Claim 13, wherein the deformation is in one of the axial, radial and circumferential directions.

15. The method of Claim 1, wherein the parameter of press-in condition is the amounts of axial displacements of the second member with reference to the first member when subjected to predetermined bilateral loads relatively

applied to the first and second members of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the movement, and stopped when the movement reaches a predetermined amount.

16. The method of Claim 1, wherein the parameter of press-in condition is bilateral loads required when subjected to predetermined axial displacements of the second member with reference to the first member of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the load, and stopped when the load reaches a predetermined amount.

17. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween, the third and fourth raceways fitted onto the

second member in a relatively movable interference relationship, such that the third and fourth raceways are movable toward each other with an axial force relatively applied to the third and fourth raceways, and

the method comprising the steps of relatively applying the axial force to the third and fourth raceways so as to move the third and fourth raceways closer to each other while detecting a parameter of press-in condition and stopping the axial force when the parameter reaches a predetermined value, thereby applying a preload to the bearing apparatus.

18. The method of Claim 17, wherein the parameter of press-in condition is a rotation vibration of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the rotation vibration of the bearing apparatus, and stopped when the rotation vibration of the bearing apparatus reaches a predetermined value.

19. The method of Claim 18, wherein the rotation vibration is produced in one of a moment direction, a direction perpendicular to the axis, and an axial direction.

20. The method of Claim 17, wherein the parameter of press-in condition is a rotation sound of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the rotation sound of

the bearing apparatus, and stopped when the rotation sound of the bearing apparatus reaches a predetermined value.

21. The method of Claim 17, wherein the parameter of press-in condition is a response to a vibration applied to the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the response, and stopped when the response reaches a predetermined value.

22. The method of Claim 17, wherein the parameter of press-in condition is a rotation torque of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the torque, and stopped when the torque reaches a predetermined value.

23. The method of Claim 17, wherein the parameter of press-in condition is an electric power consumption of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the electric power consumption, and stopped when the electric power consumption reaches a predetermined value.

24. The method of Claim 17, wherein the parameter of press-in condition is a pressure on on the third and fourth raceways moved closer to each other, and the third and fourth raceways are moved closer to each other while detecting the pressure, and stopped when the pressure increases to a predetermined value.

25. The method of Claim 24, wherein a temperature difference is produced between the third and fourth raceways and the second member to reduce the amount of interference, and removed after the third and fourth raceways moved closer to each other are stopped.

26. The method of Claim 24, wherein a temperature difference is produced between the third and fourth raceways and the second member to eliminate the interference, and removed after the third and fourth raceways moved closer to each other are stopped.

27. The method of Claim 17, wherein the parameter of press-in condition is a capacitance between the radially opposed raceways with the balls therebetween, and the third and fourth raceways are moved closer to each other while detecting the capacitance, and stopped when the capacitance reaches a predetermined value.

28. The method of Claim 17, wherein the parameter of press-in condition is an electric resistance between the radially opposed raceways with the balls therebetween, and the third and fourth raceways are moved closer to each other while detecting the electric resistance, and stopped when the electric resistance reaches a predetermined value.

29. The method of Claim 17, wherein the parameter of press-in condition is a deformation of at least one of the raceways, and the third and fourth raceways are moved closer to each other while detecting the deformation, and

stopped when the deformation reaches a predetermined amount.

30. The method of Claim 29, wherein the deformation is produced in one of axial, radial and circumferential directions.

31. The method of Claim 17, wherein the parameter of press-in condition is a movement of the second member toward the first member under a predetermined load relatively applied to the first and second members of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the movement, and stopped when the movement reaches a predetermined amount.

32. The method of Claim 17, wherein the parameter of press-in condition is a load required for a predetermined movement of the second member toward the first member of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the load, and stopped when the load reaches a predetermined amount.

33. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween, the third raceway prevented from being more spaced from the fourth raceway on the second member, the fourth raceway fitted onto the second member in a relatively movable interference relationship, such that the fourth raceway is movable toward the third raceway with an axial force relatively applied to the fourth raceway and the second member, and

the method comprising the steps of relatively applying the axial force to the fourth raceway and the second member so as to move the fourth raceway closer to the third raceway while detecting a rigidity of the bearing apparatus and stopping the axial force when the rigidity reaches a predetermined value, thereby applying a preload to the bearing apparatus.

34. The method of Claim 33, wherein the rigidity is determined from the relationship with a rotation vibration of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the rigidity of

the bearing apparatus, and stopped when the rigidity of the bearing apparatus reaches a predetermined value.

35. The method of Claim 34, wherein the rotation vibration is produced in one of a moment direction, in a direction perpendicular to the axis, and in an axial direction.

36. The method of Claim 33, wherein the rigidity is determined from the relationship with a rotation sound of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the rotation sound of the bearing apparatus, and stopped when the rotation sound of the bearing apparatus reaches a predetermined value.

37. The method of Claim 33, wherein the rigidity is determined from the relationship with a response to a vibration applied to the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the response, and stopped when the response reaches a predetermined value.

38. The method of Claim 33, wherein the rigidity is determined from the relationship with a movement of the second member toward the first member under a predetermined load relatively applied to the first and second members of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the movement,

and stopped when the movement reaches a predetermined amount.

39. The method of Claim 33, wherein the rigidity is determined from the relationship with a load required for a predetermined movement of the second member toward the first member of the bearing apparatus, and the fourth raceway is moved closer to the third raceway while detecting the load, and stopped when the load reaches a predetermined amount.

40. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other than a predetermined distance,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween, the third and fourth raceways fitted onto the second member in a relatively movable interference relationship, such that the third and fourth raceways are

movable toward each other with an axial force relatively applied to the third and fourth raceways,

the method comprising the steps of relatively applying the axial force to the third and fourth raceways so as to move the third and fourth raceways closer to each other while detecting a rigidity of the bearing apparatus, and stopping the axial force when the rigidity reaches a predetermined value, thereby applying a preload to the bearing apparatus.

41. The method of Claim 40, wherein the rigidity is determined from the relationship with a rotation vibration of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the rotation vibration of the bearing apparatus, and stopped when the rotation vibration of the bearing apparatus reaches a predetermined value.

42. The method of Claim 41, wherein the rotation vibration produced in one of a moment direction, a direction perpendicular to the axis, and an axial direction.

43. The method of Claim 40, wherein the rigidity is determined from the relationship with a rotation sound of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the rotation sound of the bearing apparatus, and stopped when the

rotation sound of the bearing apparatus reaches a predetermined value.

44. The method of Claim 40, wherein the rigidity is determined from the relationship with a response to a vibration applied to the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the response, and stopped when the response reaches a predetermined value.

45. The method of Claim 40, wherein the rigidity is determined from the relationship with a movement of the second member toward the first member under a predetermined load relatively applied to the first and second members of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the movement, and stopped when the movement reaches a predetermined amount.

46. The method of Claim 40, wherein the rigidity is determined from the relationship with a load required for a predetermined movement of the second member toward the first member of the bearing apparatus, and the third and fourth raceways are moved closer to each other while detecting the load, and stopped when the load reaches a predetermined amount.

47. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and

second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween, the third raceway prevented from being more spaced from the fourth raceway on the second member, the fourth raceway fitted onto the second member in a relatively movable interference relationship, such that the fourth raceway is movable toward the third raceway with an axial force relatively applied to the fourth raceway and the second member, and

the method comprising the steps of obtaining an internal clearance of the bearing apparatus and a position of the fourth raceway to determine a movement distance required for preloading, applying an axial force relatively between the fourth raceway and the second member, moving the fourth raceway toward the third raceway by the movement distance required for preloading, thereby applying a preload to the bearing apparatus.

48. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween, the third and fourth raceways fitted onto the second member in a relatively movable interference relationship, such that the third and fourth raceways are movable toward each other with an axial force relatively applied to the third and fourth raceways,

the method comprising the steps of obtaining an internal clearance of the bearing apparatus and a position of the fourth raceway to determine a movement distance required for preloading, applying an axial force relatively between the third and fourth raceways, moving the third and fourth raceways toward each other by the movement distance

required for preloading, thereby applying a preload to the bearing apparatus.

49. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween,

the preload applied to the bearing apparatus in one of the manners that the third raceway is prevented from being more spaced from the second member, and the fourth raceway is fitted onto the second member in a relatively movable interference relationship, such that the fourth raceway is moved toward the third raceway with an axial force relatively applied to the fourth raceway and the second member, and that the third and fourth raceways are fitted onto the second member in a relatively movable interference

relationship, such that the third and fourth raceways are moved toward each other with an axial force relatively applied to the third and fourth raceways,

the method comprising the steps of applying a first axial force to the second member with reference to the first member in a first direction from the fourth raceway to the third raceway to determine a first state, applying a second axial force to the second member with reference to the first member in a second direction from the third raceway to the fourth raceway to determine a second state, obtaining a movement distance of the second member with reference to the first member from the first state to the second state, calculating a difference in rigidity from the first state to the state where a present amount of rigidity is obtained, calculating a difference in rigidity from the second state to the state where the present amount of rigidity is obtained, and moving the fourth raceway by the sum of the movement distance of the second member with reference to the first member and the differences in rigidity from the first and second states to the state where the preset amount of rigidity is obtained.

50. A preload-controlled bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween,

the third raceway prevented from being more spaced from the second member, and the fourth raceway fitted onto the second member in a relatively movable interference relationship, such that the fourth raceway is axially movable with an axial force relatively applied to the fourth raceway and the second member, and

the first member formed with first and second raceways in a single body, the second member formed separately from the third and fourth raceways, each of the raceways formed in an arcuate shape and cross section, wherein the preload is applied to the bearing apparatus.

51. A preload-controlled bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween,

the third and fourth raceways fitted onto the second member in a relatively movable interference relationship, such that the third and fourth raceways are axially movable with an axial force relatively applied to the third and fourth raceways. and

the first member formed with first and second raceways in a single body, the second member formed separately from the third and fourth raceways, each of the raceways formed in an arcuate shape in cross section, wherein the preload is applied to the bearing apparatus.

52. The preload-controlled bearing apparatus of one of Claims 50 and 51, wherein the raceways formed in a deep groove type.

53. The preload-controlled bearing apparatus of one of Claims 50 and 51, wherein the first member is an outer ring, the second member is a shaft extending through the outer ring, and the axial distance between the contact

points of the first and second raceways with the balls is shorter than the axial distance between the contact points of the third and fourth raceways with the balls to provide higher moment rigidity of the bearing apparatus.

54. A method of preloading a preload-adjustable bearing apparatus comprising first and second members which are relatively rotatable to each other, and first and second ball rows which are provided radially between the first and second members and have a plurality of balls, respectively,

the first member having first and second raceways which are axially juxtaposed and prevented from being closer to each other,

the second member having a third raceway which is opposed to the first raceway of the first member with the first ball row therebetween, and a fourth raceway which is axially juxtaposed to the third raceway and opposed to the second raceway of the first member with the second ball row therebetween,

the preload applied to the bearing apparatus in one of the manners that the third raceway is prevented from being more spaced from the second member, and the fourth raceway is fitted onto the second member in a relatively movable interference relationship, such that the fourth raceway is movable toward the third raceway with an axial force relatively applied to the fourth raceway and the second

member, and that the third and fourth raceways are fitted onto the second member in a relatively movable interference relationship, such that the third and fourth raceways are movable toward eachother with an axial force relatively applied to the third and fourth raceways,

the method comprising the steps of relatively applying the axial force to the fourth raceway and the second member so as to move the fourth raceway to the third raceway while detecting a responce to a vibration applied to at least one of the fourth raceway and the second member of the bearing apparatus and stopping the axial force when the response reaches a predetermined value, thereby applying the preload to the bearing apparatus.

55. The method of Claim 54, wherein the electric signal is applied to an element which is deformed in an axial direction corresponding to the electric signal.

56. The method of Claim 54, wherein both of the fourth raceway and the second member are vibrated in a manner that when one of the fourth raceway and the second member is contracted, the other is expanded.

57. The method of Claim 54, wherein the electric signal is applied to an element which is deformed in a direction perpendicular to the axial direction corresponding to the electric signal.